

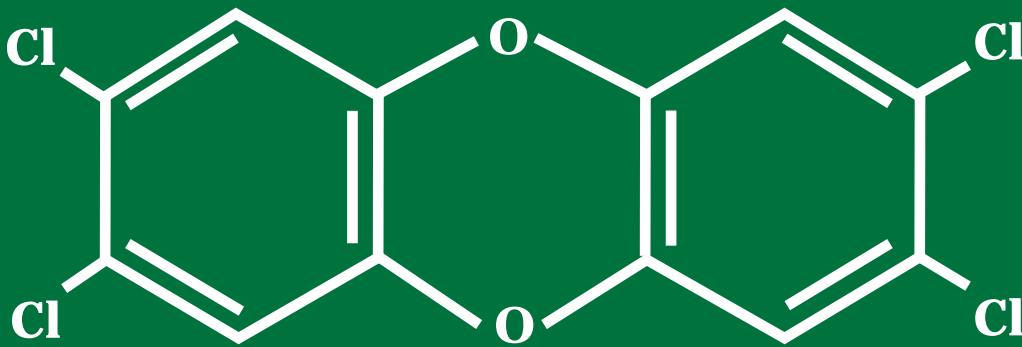


Bay Area Dioxins Project



Association of Bay Area
Governments

Bay Area Dioxins Project Final Report



February 2004

Report prepared for Bay Area Dioxins Project.

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This report reviews the efforts taken by local government agencies in the San Francisco Bay Area to prevent the formation of dioxins. The report does not necessarily reflect the views of ABAG policy bodies, and no official endorsement should be inferred. Actions evaluated need prior approval by local jurisdictions before implementation.

February 2004

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Executive Summary

This report describes the efforts of the Bay Area Dioxins Project to develop pollution prevention demonstration projects targeting sources of dioxins with the purpose of identifying feasible approaches for municipalities to reduce the release of dioxins to the environment. Demonstration projects were selected based on sources and pollution prevention options identified in the *Screening Evaluation of Dioxins Pollution Prevention Options*.

Demonstration projects were selected based on a variety of factors including cost, gaps in existing municipal programs, appropriateness for regional action, interest/availability of local agencies, public interest, and feasibility. The following demonstration projects were selected:

- Process Chlorine Free (PCF) Paper Purchasing
- Polyvinyl Chloride (PVC) Alternatives in Building Materials
- Diesel Fuel Alternatives
- Medical Waste Management

Demonstration Project Descriptions

The goals and products for each demonstration project are discussed below. All the materials described below are available on the Bay Area Dioxins Project website (<http://dioxin.abag.ca.gov>) under Pilot Project Materials.

PCF Paper Purchasing

The goal of this project was to investigate options for, and facilitate purchasing of, chlorine-free paper. A list of chlorine free paper products was assembled and reviewed by the Bay Area Dioxins Project (Dioxins Project). After reviewing the types of paper products for which chlorine free paper was an alternative, it was decided to focus on 'process chlorine free' (PCF) copy paper for the demonstration project. To aid local governments in implementing plans to purchase PCF paper, the following support materials were developed:

- FAQ – “Getting Started on Chlorine-Free Paper Purchasing”
- Purchasing Information Packet (model Environmentally Preferable Purchasing Policies, Paper Specification, Tips, Resources)
- Paper Purchasing Pool Information

PVC Alternatives in Building Materials

The goal of this project was to investigate options to PVC materials used in construction and develop information to facilitate purchasing these alternatives. The Healthy Building Network (www.healthybuilding.net) has developed a great deal of information on

building materials that contain PVC, and acceptable alternatives, which was used for this project. Materials developed for this project included:

- FAQ – “Incorporating Alternatives to PVC in Buildings”
- Information Packet: Alternatives to PVC Building Materials (non-PVC options for flooring, wall coverings, window coverings, siding, plumbing, and roofing materials, with vendor and price information as available).

Diesel Fuel Alternatives

The purpose of this project was to identify funding opportunities to assist municipalities in converting or replacing diesel fuel vehicles and to obtain case studies for existing local diesel conversion projects. Materials developed for this project included:

- Memorandum: Funding for Municipal Diesel Vehicle Fuel Conversion or Replacement with Alternative Fuel Vehicles
- Diesel Alternative Case Studies

Medical Waste Management

The purpose of this project was to identify alternatives to incineration for medical waste management and obtain Bay Area-specific information with respect to costs, vendors and regulatory requirements associated with the alternatives. Autoclaving was found to be the only practical alternative to incineration for management of the majority of the Bay Area’s medical waste. Materials were developed to facilitate decision-making by hospitals about medical waste management. Materials were developed for the project in cooperation with the Healthcare Pollution Prevention Project and included:

- Fact Sheet – Managing Medical Waste: Important Choices for Acute Care Hospitals
- Fact Sheet – Permit Requirements for Installing Autoclaves at Acute Care Hospitals
- FAQ: Autoclaving an Acute Care Hospital’s Regulated Medical Waste
- Vendor list
- Resources
- Autoclaving Cost Worksheet

Project Findings

A review of Bay Area activities indicates that pollution prevention targeting dioxins is widespread. Specifically,

- Bay Area government agencies are currently seeking to reduce dioxins releases associated with 10 of the 11 dioxins sources considered in the *Screening Evaluation of Dioxins Pollution Prevention Options*.

- Implementation of actions that reduce dioxins releases from 2,4-D (broadleaf weed herbicide) use, diesel vehicle emissions, and wood burning is widespread among Bay Area municipalities.
- The vast majority of municipal dioxins pollution prevention actions have been institutionalized, either by incorporation into existing municipal programs, adoption by ordinance, or inclusion in larger municipal policy initiatives. This makes continued implementation likely.

The Bay Area Dioxins Project has provided tools and resources that will facilitate implementation by municipalities of projects to reduce the use of chlorine bleached papers, PVC building materials, and diesel fuel vehicles. These actions should reduce the release of dioxins to the environment. In addition the projects provide tools that will assist hospitals in reducing the generation and release of dioxins resulting from medical waste management practices.

It is difficult to directly measure the impact of the Dioxins Project. This is due to lack of environmental data, time frame over which change will occur, and the variety of programs being conducted in the Bay Area that target dioxins. However, a qualitative assessment of each of the project results is presented below.

PCF Paper Purchasing

Three municipalities, San Francisco, Alameda County, and Palo Alto, are purchasing significant amounts of PCF paper. The amount purchased by Alameda County is 5% of the total copy paper purchased by the County. For Palo Alto, in 2002, 100% of the letterhead, office paper, toilet paper, and paper towels purchased by the City were PCF paper. For budgetary reasons, the City switched to elemental chlorine free (ECF) office copy paper and toilet paper in 2003 but continues to purchase PCF letterhead and paper towels. Approximately 1.8% of the copy paper purchased by San Francisco is PCF paper. The tools developed through the PCF Paper Purchasing Demonstration Project will facilitate the process that other municipalities will go through to make the same switch to PCF paper. In addition to providing sample policies, purchasing specifications, and specific information on PCF paper suppliers, the project was also able to identify a reasonably priced approach to purchasing PCF paper through the Recycled Products Purchasing Cooperative (RPPC) purchasing pool.

PVC Building Alternatives

This project has consolidated and made available a variety of resources to assist municipalities with incorporating PVC alternatives into building projects. While specific reductions in the use of PVC are not quantifiable, three municipalities (San Francisco, Palo Alto, and Berkeley) have programs where PVC alternatives are being utilized in building projects. As specific projects near completion, quantities of PVC avoided could be measured but none of the projects is at a stage to facilitate this measurement.

Medical Waste Management

In the Bay Area, hospitals are subject to multiple pressures to rethink medical waste management methods:

- economic pressure, primarily from increasing waste management fees,
- political pressure, from community groups like Health Care Without Harm affiliates, and
- municipal pressure, primarily related to this project.

It is not currently possible to tease out the effect of the Bay Area Dioxins Project work from the effects of these other forces. However, colloquial information suggests that the trend is away from incineration and toward autoclaving of regulated medical waste, either on-site or at an off-site vendor location (primarily Stericycle's facility in San Leandro). On the basis of interviews with hospital and vendor staff and data from Alameda County's limited survey, it is possible to roughly estimate that between 25 and 50% of Bay Area hospitals now autoclave the majority of their regulated medical waste. Avoiding incineration of this waste (and the associated long-distance hauling of this waste to incinerators in Utah or Texas) may prevent as much as 0.5 to 1 gram of dioxins (TEQ, WHO-98) air emissions annually (see estimate in Appendix B, actual value is probably lower). Comparison to the Bay Area Air Quality Management District's estimate of regional dioxins emissions (about 2 grams per year), one can see that a reduction of this order of magnitude is meaningful.

Diesel Fuel Alternatives

A variety of funding sources were identified by the Dioxins Project to purchase alternative fuel vehicles and, as noted in the implementation review, all the municipalities participating in the project have received grant funds to support diesel emissions reduction actions. Specifically all the participating municipalities have compressed natural gas (CNG) vehicles. For example 20% of Palo Alto's vehicle fleet operates on CNG and 50% of the Port of Oakland's airport ground fleet uses alternative fuels. More than 265 CNG vehicles were purchased in FY 2001-2003 by San Francisco Bay Area municipalities. In addition, several agencies including the Cities of Berkeley and Palo Alto and the San Francisco Airport have converted vehicles to biodiesel. Berkeley converted 90% of its vehicles to biodiesel in 2003. In 2002, approximately 11% of the diesel fuel purchased by Palo Alto was biodiesel.

Future Directions/Next Steps

Efforts to reduce dioxin releases to the environment are underway and are targeting a range of dioxin sources. Many Bay Area municipalities have demonstrated a commitment to reducing dioxin releases through adoption of formal policies and implementation of specific actions. Future directions should focus on expanding existing programs, assisting agencies in initiating new efforts (e.g., getting more municipalities to replace diesel vehicles with clean-fueled vehicles) and developing information that would

allow for quantification of reductions either indirectly through measurement of reduced use of dioxin sources (e.g., paper, PVC, diesel, 2,4-D, etc.) or directly through air quality or water quality measurement.

Introduction

This report describes the efforts of the San Francisco Bay Area Dioxins Project to identify and help Bay Area municipalities implement feasible approaches for municipalities to reduce the release of dioxins to the environment. The report describes the project in the following sections:

- Background is provided on Federal, state and San Francisco Bay Area activities targeting dioxins
- The Bay Area Dioxin Project is described with respect to goals, approach and demonstration project results.
- A review of overall municipal dioxin pollution prevention activity in the Bay Area is presented.
- A summary and assessment of dioxin pollution prevention in the Bay Area is included as well as recommendations for future Bay Area activities focused on dioxins.

Background

"Dioxins" are a group of chemical compounds that are members of three closely related families: the chlorinated dibenzo-p-dioxins (CDDs), chlorinated dibenzofurans (CDFs) and certain polychlorinated biphenyls (PCBs). CDDs and CDFs are not created intentionally, but are produced inadvertently by a number of human activities. CDDs and CDFs are also produced by natural processes. PCBs are man-made, but are no longer produced in the United States.

Dioxins are released into the air from combustion processes such as commercial or municipal waste incineration and from burning fuels (like wood, coal, or oil). Dioxins can also be formed when household trash is burned and during forest fires. Chlorine bleaching of pulp and paper, certain types of chemical manufacturing and processing, and other industrial processes all can create small quantities of dioxins. Natural sources of dioxins include volcanoes and forest fires.

Concern over the adverse health impacts of exposure to dioxins has prompted activities at the Federal and State levels to evaluate dioxin sources and their impacts and to reduce the generation and release of dioxins into the environment. Over the past decade, EPA and industry have worked together to reduce dioxin emissions dramatically.

U.S. Environmental Protection Agency (EPA) Activities

In 1991, EPA began a scientific reassessment of the health risks of exposure to dioxin and dioxin-like compounds. The draft dioxin reassessment consists of three parts. *Part I: Estimating Exposure to Dioxin-Like Compounds* includes three volumes that focus on sources, levels of dioxin-like compounds in environmental media, and human exposures. *Part II: Health Assessment for 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds* consists of two volumes that include information on critical human health end points, mode of action, pharmacokinetics, dose-response, and TEFs. Part II has nine chapters. *Part III: Integrated Summary and Risk Characterization for 2,3,7,8-*

Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds is intended as a stand-alone document. Part III summarizes the overall conclusions of the reassessment. This part describes key findings pertinent to the potential hazards and risks of dioxins, including a discussion of all important assumptions and uncertainties.

Because the assessment is of interest to various government agencies, EPA has consulted with the Interagency Working Group on Dioxin (IWG) on its draft dioxin reassessment. Based on that consultation, the EPA, along with other members of the IWG, has asked the National Academy of Sciences (NAS) to provide an additional review to help ensure that the risk estimates contained in the draft are scientifically robust and that there is a clear delineation of all associated uncertainties. The EPA will evaluate the draft report in light of the NAS comments and will make appropriate revisions to the draft to address those comments. The EPA then plans to prepare the reassessment for release in its final form.

In addition to conducting the reassessment, EPA has conducted activities to reduce and control dioxins in all environmental media in the United States. Collectively, these actions have resulted in strict controls on all of the known and quantifiable major industrial sources of dioxin releases. As a result of EPA's efforts, along with efforts by state government and private industry, known and quantifiable industrial emissions in the United States have been reduced by more than 90% from 1987 levels. For example, municipal waste combustors are estimated to have emitted collectively nearly 18 pounds of dioxin toxic equivalents in 1987, but under EPA regulations, they are now expected to emit less than 1/2 ounce per year. Similarly, medical waste incinerators emitted about 5 pounds of dioxin equivalents in 1987, but under EPA regulations they now will be limited to about 1/4 ounce annual emissions. EPA has implemented similarly strict standards for other dioxin sources. Through expanded monitoring and research collaboration with the Food and Drug Administration (FDA), the Food Safety and Inspection Service (FSIS), and the Centers for Disease Control and Prevention (CDC), EPA is also making progress in characterizing additional sources.¹

California Environmental Protection Agency Activities

In California, the California Air Resources Board (ARB) has taken steps to reduce exposure to dioxins and other air toxics. In 1990, the ARB adopted the Dioxin Airborne Toxic Control Measure for Medical Waste Incinerators to reduce emissions of dioxins from medical waste incinerators by 99 percent. At that time, medical waste incinerators were one of the largest known air sources of dioxins in California. As a result of the control measure, the number of medical waste incinerators in the state dropped sharply from about 150 to less than ten.²

¹ Interagency Working Group on Dioxins. Questions and Answers About Dioxins. <http://www.cfsan.fda.gov/~lrd/dioxinqa.html#g11>, October, 2003.

² California Air Resources Board. What ARB is Doing About Dioxins. www.arb.ca.gov/toxics/dioxins/info.htm, October, 2003.

In addition, the ARB is developing a comprehensive air quality monitoring and testing program to collect ambient data for dioxins, furans, dioxin-like polychlorinated biphenyls (PCBs), and polybrominated di-phenyl ethers (PBDEs) in California. Under this program, the ARB will evaluate potential health impacts, assess the need for additional risk management strategies, and identify areas where additional study may be required. The program's components include: the development of the California Ambient Dioxin Air Monitoring Program (CADAMP) at a total of nine locations in the state (five in the San Francisco Bay Area and four in the South Coast Air Basin); the testing of potential dioxin-emitting facilities; and estimating the contribution of dioxins emitted by motor vehicles.

In the Bay Area, the Bay Area Air Quality Management District (BAAQMD) has also implemented programs addressing dioxins. As noted above, in cooperation with the California Air Resources Board and the EPA, the BAAQMD has established an ambient air dioxin monitoring network with sampling locations in San Jose, Richmond, San Francisco, Marin County, and Oakland. In addition, as part of its public outreach efforts, the BAAQMD has an ongoing effort to prevent wood burning and wood smoke that includes the development of a model ordinance that has been adopted by many municipalities in the Bay Area.³

Bay Area Dioxins Project

With respect to efforts by local government in the Bay Area, since 1999, several Bay Area municipalities have passed resolutions on dioxins and persistent bioaccumulative toxins (PBTs). To meet the challenge of these resolutions calling for dioxins pollution prevention and the elimination of dioxin compounds, the municipalities initiated the Bay Area Dioxins Project under the auspices of the Association of Bay Area Governments. Participants in the Dioxins Project included the City and County of San Francisco, County of Alameda, and Cities of Palo Alto, Oakland and Berkeley, and the Port of Oakland along with ABAG staff.

The main goals of the Bay Area Dioxins Project were:

- To pool local governments' knowledge and resources to study the problems of dioxins and to provide information about possible solutions or actions for local governments in the San Francisco Bay area;
- To coordinate with efforts of state, Federal, and regional agencies working on dioxins issues;
- To work with community groups, trade and industry groups, and the general public on issues of concern related to dioxins.

The Association for Bay Area Governments was responsible for overall project management and coordination with project participants. Three organizations acted as consultants to ABAG and the Dioxins Project:

- TDC Environmental and Larry Walker Associates served as technical consultants

³ www.baaqmd.gov

- The Center for Environmental Health consulted with the task force on public outreach issues and stakeholder involvement

The main focus of this report is to document the specific pollution prevention projects initiated by government agencies around the bay. This phase followed the initial *Screening Evaluation of Dioxins Pollution Prevention Options* and an extensive public outreach effort. Project materials have been posted on the project web site <http://dioxin.abag.ca.gov/>. These include:

- The *Screening Evaluation of Dioxins Pollution Prevention Options* Report
http://dioxin.abag.ca.gov/p2_report.htm
- Report on Public Participation Process
http://dioxin.abag.ca.gov/pdf/progress_report_memo.pdf
- Pilot Project Materials (http://dioxin.abag.ca.gov/project_materials.htm)

The Bay Area Dioxins Project and the City of Oakland hosted a dioxin workshop and vendor fair on September 18, 2002, at Oakland City Hall. The event, entitled "Government Operations and Dioxins Pollution Prevention in the San Francisco Bay Area," was designed for public agency staff and elected officials as a primer on the human and environmental impacts of dioxins, and the relevant tools, examples, and vendors used by local agencies to purchase products that reduce dioxin emissions.

The workshop's morning session included opening remarks by ABAG's executive director and by the former mayor of Richmond, and presentations from environmental experts at EPA Region 9, the California Department of Toxic Substances Control, consulting firms, nonprofit organizations, and Oakland Councilmember Nancy Nadel. The afternoon session focused on success-story testimonials by representatives from the City of Palo Alto, the City of Berkeley, West Valley College, the Chlorine-Free Paper Association, the Clean Cities Program, and the Healthy Building Network.

Since the conference, municipalities have discussed implementation issues at Bay Area Dioxins Project meetings. As is documented in this report, public agencies in the Bay Area have undertaken a wide variety of dioxins pollution prevention initiatives since 1999. Even though the project is complete, we anticipate that public agencies around the San Francisco Bay will continue to work at preventing dioxins pollution.

Dioxins Pollution Prevention (P2) Project Approach

Individually and at Bay Area Dioxins Project meetings, participating municipalities evaluated the information in the *Screening Evaluation* to determine how best to proceed with their dioxins pollution prevention efforts. The municipalities determined that many of the feasible dioxins pollution prevention actions were best pursued on an individual basis – and in fact, many of the actions were already underway in their municipalities. The municipalities also identified dioxins pollution prevention measures for which additional information or educational materials were needed to promote regional or individual municipal action. This latter group of measures became the focus of the second phase of the project, which involved development of resources and initial use of those resources in a set of dioxins pollution prevention demonstration projects.

The goals of the demonstration projects were to prevent environmental releases of dioxins and to provide practical information to support local, regional, and national dioxins pollution prevention efforts. The specific objectives to achieve these goals were to:

- Assist local governments in establishing pollution prevention programs to eliminate dioxins.
- Study obstacles facing local governments in implementing such projects and to find solutions to any identified barriers.
- Document successes and limitation of local governments in their efforts to implement local ordinances calling for the elimination of dioxins as environmental pollutants.

The overall approach, project selection process and project results are described below.

Approach

The project approach was to select pilot pollution prevention projects identified in the *Screening Evaluation* that would be feasible for local governments and for which regional resources would be useful, to implement the selected projects, and, based on the project results, develop tools to enable local governments to implement similar projects on their own. The project approach is described in more detail below.

The *Screening Evaluation* reviewed options that could be considered by local government agencies in the San Francisco Bay Area to prevent the formation of dioxins. The report identified and evaluated pollution prevention options for 11 potential dioxin sources including

- 2,4-D (broadleaf weed herbicide)
- agricultural burning
- diesel engines
- drum reclamation
- medical waste incineration
- paper bleaching
- pentachlorophenol
- petroleum refining
- polychlorinated biphenyls (PCBs)
- polyvinyl chloride (PVC, “vinyl”)
- wood burning

Potential P2 projects that were identified by the *Screening Evaluation*, that are within the jurisdiction of local governments, that were not fully implemented by Bay Area municipalities, and for which regional resources could promote implementation included:

- Medical waste management (promoting alternatives to incineration)

- Process chlorine free (PCF) paper purchasing
- Adopt the BAAQMD model wood burning ordinance
- Promote better fireplace management
- Diesel fuel vehicles alternatives
- Alternatives to PVC building products
- 2,4-D use reduction

Project Selection

Demonstration projects were selected based on a variety of factors including cost, gaps in existing municipal programs, appropriateness for regional action, interest/availability of local agencies, public interest, and feasibility. For example, several local governments have adopted wood burning ordinances and the BAAQMD has an existing outreach program regarding better fireplace management. In addition, there are existing pesticide management programs in the Bay Area that could be used as the basis for a 2,4-D reduction program. Both the better fireplace management and 2,4-D use reduction projects would rely on a public outreach campaign which would be beyond the budget of the Bay Area Dioxins Project.

Several municipalities were interested in developing PCF paper purchasing programs and did not feel that the tools to do this were readily available. Similarly, several of the municipalities had hospitals within their jurisdiction for which waste management projects were proposed or in progress. In addition, a partnering opportunity was available for the medical waste management project with the Health Care Pollution Prevention Project. Municipalities were also interested in obtaining information on grants for replacing diesel fuel vehicles in municipal fleets. Information was not readily available regarding PVC alternatives for building materials. These projects were all within the budget of the project and feasible for municipalities to implement. In addition these projects had not been widely implemented by other Bay Area entities.

Public input was also considered as part of the project selection process. Representatives from industry, environmental groups and the general public provided input regarding demonstration project interests. A summary of the public input is shown in Table 1. The projects receiving the most comments in support of selection were the Medical Waste Management and PVC Alternatives projects.

Table 1. Review of Public Input on Dioxin P2 Projects

Dioxin Source	No. of Comments	For Project	Against Project
Medical Waste	12	12	0
PVC-Buildings	10	9	1
PVC-Medical	10	9	1
2,4-D	7	7	0
Paper	6	5	1
Fireplaces	7	3	4
PCBs	3	3	0
Diesel Fuel	3	2	1
Refineries	2	2	0

Based on the factors listed above the following demonstration project were selected as demonstration project:

- PCF Paper Purchasing
- PVC Alternatives in Building Materials
- Diesel Fuel Alternatives
- Medical Waste Management

P2 Project Descriptions

The goals and products for each demonstration project are discussed below. All the materials described below are available on Bay Area Dioxins Project website (<http://dioxin.abag.ca.gov>) under Pilot Project Materials.

PCF Paper Purchasing

The goal of this project was to investigate options for and facilitate purchasing of chlorine-free paper. A list of chlorine free paper products was assembled and reviewed by the Bay Area Dioxins Project. After reviewing the types of paper products for which chlorine free paper was an alternative, it was decided to focus on ‘process chlorine free’ (PCF) copy paper for the demonstration project. Some information was also gathered on PCF toilet paper.

To aid local governments in implementing plans to purchase PCF paper, materials were developed for purchasing agents in developing purchasing policies and implementing purchasing plans for PCF paper. The following support materials were developed:

- *FAQ – “Getting Started on Chlorine-Free Paper Purchasing”* – This document provides information on how dioxins are generated in the paper making process, what types of chlorine-free paper are available, and the cost and availability of PCF copy paper and toilet paper. Information was also provided regarding specific brands of PCF paper including the local distributor, price, and contact information. Quality and performance of PCF paper was also discussed as was the certification process for PCF paper. Finally, local government contacts with experience purchasing PCF paper were included.

- *Purchasing Information Packet* – This packet provided model Environmentally Preferable Purchasing Policies, Paper Specification, Tips, and Resources. Environmentally Preferable Purchasing (EPP) Policies from Vermont, Massachusetts, and Washington along with two more generic, model policies are included in this packet. Each EPP policy includes language regarding the purchase of PCF paper. Model bid requests or Requests for Proposals (RFPs) including PCF requirements are provided in the packet. While most of these focus on copy paper requirements, one is an RFP for custodial products (i.e., includes paper towels). A copier contract that includes language about performance with recycled paper and reporting requirements in the Wisconsin Paper Contract are included. Tips on buying PCF paper from EPA, Wisconsin, and INFORM are also provided. Information produced by Alameda County on buying recycled paper locally is included in the packet as is information on resources and contacts for more information on Environmentally Preferable Purchasing.
- *Paper Purchasing Pool Information* – Direct purchasing of PCF paper tends to be a little more expensive than purchasing regular recycled paper. Therefore, the Bay Area Dioxins Project investigated the feasibility of creating or participating in a purchasing pool to allow purchasing of PCF paper in greater quantities as a way of getting a price reduction. Investigation of this approach identified an existing purchasing pool, the Recycled Products Purchasing Cooperative (RPPC) sponsored in part by U.S. EPA Region 9. The RPPC offered ABAG members an opportunity to purchase PCF copy paper at a price of \$29.00-33.50 per case in 2002. This compares favorably to the cost of PCF paper quoted generally as \$29 (for large quantities) to \$80.60 per case and the cost of 30% recycled paper quoted as \$23 to \$43 per case. This packet provided detailed information from RPPC regarding paper description, pricing and delivery, and ordering information.

Other group purchasing options that were identified included purchasing through Alameda County's GSA contract (\$46.60 per case) or the State's Government Services contract (\$39.50 per case). This packet also discussed issues that may be encountered using group purchasing and the availability of other paper products through a purchasing pool.

PVC Alternatives in Building Materials

The goal of this project was to investigate options to PVC materials used in construction and develop information to facilitate purchasing these alternatives. Approximately 75% of PVC produced is for building products with much of it being used for piping, vinyl siding and vinyl flooring. The Healthy Building Network (www.healthybuilding.net) has developed a great deal of information on building materials that contain PVC and acceptable alternatives; this information was used for this project.

Tools were developed to aid municipalities in identifying environmentally acceptable alternatives to PVC. Materials developed for this project included:

- FAQ – "Incorporating Alternatives to PVC in Buildings" – This document provides general information regarding PVC, its uses, its relation to dioxin

pollution. It lists alternative materials that can be used instead of PVC for piping, siding, roofing membranes, flooring, wall coverings, electrical insulation, windows and doors, and furniture. In addition, it provides resources for getting more information on PVC building material alternatives.

- **Information Packet: Alternatives to PVC Building Materials** – This packet provides specific information including product names, descriptions, cost factors, and contact information to assist local governments in procuring non-PVC options for flooring, wall coverings, window coverings, siding, plumbing, roofing materials. In addition, there are fact sheets describing different aspects of PVC alternatives and environmental issues associated with PVC.

Medical Waste Management

The purpose of this project was to provide municipalities with resources to help Bay Area hospitals explore alternatives to medical waste incineration, which is one of the nation's largest dioxins sources. The approach to the project involved building on existing related activities in the San Francisco Bay Area.

The Healthcare Pollution Prevention Project (HCP2 Project), a cooperative effort among numerous entities including the California Department of Health Services (DHS), Cal-EPA, U.S. EPA, Alameda and Contra Costa Counties, Healthcare Without Harm affiliate organizations, and several San Francisco Bay Area hospitals, developed methods to promote pollution prevention at hospitals and a strong network to support hospital pollution prevention activities. The project focused on reducing mercury use, solid waste, and medical waste. Although it developed methods to achieve significant reduction in medical waste volumes, the HCP2 Project did not specifically deal with medical waste management options selected by participating hospitals.

Although the only medical waste incinerator in California closed in 2001, San Francisco Bay Area hospitals still have the option of incinerating medical waste by utilizing services where incineration occurs out of state (primarily in Utah). While California law requires that wastes comprising 2-8% of the medical waste stream (pathological, pharmaceutical, and chemotherapy wastes) be incinerated, hospitals are free to select among other DHS-approved technologies for management of their remaining medical waste. Among the many available options, commonly employed alternatives include on-site use of autoclaves and off-site treatment by microwave (not available in Northern California) or autoclave. Although some information on alternatives existed prior to the project, no convenient, California-specific information about medical waste management alternatives, costs, vendors, and regulatory requirements was available to Bay Area hospital managers.

Building on the existing HCP2 Project, this project developed information on medical waste management alternatives for hospitals that promote voluntary conversion from incineration to an alternative technology. Since this could be a relatively significant change for some hospitals, the project design involved technical assistance and support for hospitals willing to consider changes in medical waste management practices.

Specific project activities included data collection, preparation of written materials, training, and technical support as described below.

Data Collection—Primary Findings

Regulated medical waste incineration is expensive and prices are going up—switching to an alternative off-site treatment could immediately save a hospital 10-20%; switching to an on-site autoclave saves 50%. Incinerators emit dioxins and mercury—and diesel vehicles hauling medical waste long distances emit dioxins and polyaromatic hydrocarbons—these are pollutants of concern for public health. On-site or regional medical waste treatment by autoclaving eliminates these emissions, while saving hospitals money.

Written Materials

The primary work product was an information packet suitable for distribution to Bay Area hospitals. The target audience for the written material is hospital environmental health and safety managers; a secondary audience is municipal environmental agency staff. Draft materials were reviewed by the Healthcare Pollution Prevention Project participants, Dioxins Project participants, and target audience members. Materials were distributed in electronic form for future use by municipalities.

Building from the first steps in regulated medical waste management - waste reduction and improved segregation practices (for which there is a plethora of information developed by California Department of Health Services, U.S. EPA, and others) - the dioxins project materials focus on cost savings and pollution reduction by replacing incineration with autoclaving. The packet, which is available electronically on the Bay Area Dioxins Project Internet site (<http://dioxin.abag.ca.gov/>), contains the following materials:

- Why are Hospitals Rethinking Regulated Medical Waste Management? – Background information about medical waste management and dioxins.
- Frequently Asked Questions – answers to common questions about autoclaving an acute care hospital's regulated medical waste.
- Vendor List – autoclave vendors for general acute care hospitals in California.
- Autoclaving Cost Estimate Worksheet – a detailed cost estimating interactive Excel spreadsheet for estimating the costs of on-site autoclaving of medical waste at a general acute care hospital.
- Permit Requirements for Installing Autoclaves at Acute Care Hospitals – a list of steps and a checklist for permitting an on-site autoclave at an existing general acute care hospital.
- Resources for Health Care Pollution Prevention – a list of the best available information for health care pollution prevention, mercury elimination, and evaluating medical waste treatment alternatives.

Training

For a variety of reasons unrelated to the project, the original training plan, involving presentation of project information at one or more training events sponsored by ABAG or HCP2, did not occur. Instead, project-related training involved informal training of Dioxins Project participants and HCP2 project participants during project-related meetings, and a presentation at the Western Regional Pollution Prevention Conference,

which is an annual training conference for municipal and state environmental agency staff.

Implementation Technical Support

The municipalities participating in the Bay Area Dioxins Project indicated that they preferred to work individually with their own hospitals, so the project was designed to facilitate individual implementation activities. During the project time frame, three municipalities pursued actions to implement the project.

- Berkeley – On November 14, 2003, the City of Berkeley hosted a Medical Waste Reduction Symposium. The City involved its Health Department, Health Care Without Harm, and Alameda County's only certified Green Business dentist in the workshop planning and outreach. The symposium, which was attended by about 30 hospital, dental office, and medical office staff, included presentations about the hazards of handling medical waste, green dentistry, and the campaign for environmentally responsible health care, in addition to a medical waste management presentation by Kelly Moran of TDC Environmental. After the presentation, Dr. Moran met briefly with the representative of the one hospital in the City of Berkeley (Alta Bates Hospital), who was an active participant in the symposium. City staff plan follow-up contacts with Alta Bates Hospital.
- Alameda County – On the basis of a meeting with the Alameda county medical waste inspector (who indicated a belief that many of the private hospitals in the County were already autoclaving their waste), Alameda County decided to survey its hospitals to determine their medical waste management methods and to mail any interested hospital copies of the project written materials (which all survey respondents requested). Of the 19 hospitals in Alameda County, 5 responded to the survey. All 5 survey respondents manage medical waste through off-site treatment – 3 by incineration and 2 by autoclaving waste that does not require incineration. The County inspector and hospital staff interviewed by TDC Environmental during the project were familiar with waste management methods for 3 other Alameda County hospitals, all of which autoclave on-site. While this data represents fewer than half of Alameda County hospitals, it shows that more than 25% of County hospitals manage the majority of their regulated medical waste via autoclaving rather than incineration. The original plan to work directly with Alameda County's two hospitals had to be dropped due to the need to reduce the project budget mid-way through the project and coincident County hospital staff unavailability during the project time frame.
- Palo Alto – On September 9, 2003, the City of Palo Alto held a meeting with representatives of its three medical centers (Stanford, Veterans' Administration, and Palo Alto Medical Foundation). City staff described the City's motivation for and commitment to dioxins pollution prevention, linking the issue to the City's wastewater treatment system, which issues wastewater discharge permits to all three medical centers. TDC Environmental provided background on dioxins and reviewed the materials in detail with the medical center representatives. On November 20, 2003, City staff and TDC Environmental held a similar meeting with representatives of the one other hospital in the Palo Alto Regional Water Quality Control Plant's service area (El Camino Hospital in Mountain View). Of

the four facilities, one (Stanford) recently installed autoclaves; the remaining three ship waste off-site for treatment, but staff at the meetings did not know if waste was incinerated or autoclaved. City staff plan follow-up contacts with the latter three hospitals.

Project materials were also widely distributed to facilitate use of the information by entities that are not participating in the Bay Area Dioxins Project. Among the information recipients were: participants in the HCP2 work group, members of the national Hospitals for a Healthy Environment listserve, members of the national Health Care without Harm network, and members of the Western Regional Pollution Prevention Network.

Diesel Fuel Alternatives

The purpose of this project was to identify funding opportunities to assist municipalities in converting or replacing diesel fuel vehicles and to obtain case studies for existing local diesel conversion projects. Materials developed for this project included:

- Memorandum: Funding for Municipal Diesel Vehicle Fuel Conversion or Replacement with Alternative Fuel Vehicles – This memorandum provided information regarding a variety of grants available to municipalities. Information provided includes grant criteria, funding limits, funding cycle and contacts and/or internet links to obtain information and applications. Bay Area projects receiving funding in 2001/2002 are also listed.
- Diesel Alternative Case Studies – Case studies describing specific projects where diesel fuel vehicles were replaced with alternative technology are described. Three projects by Alameda County, one by Palo Alto and two by the Port of Oakland are described. In addition, case studies from three non-Bay Area Dioxins Project government agencies are described (*i.e.* Sunnyvale, Cincinnati, and Yellowstone National Park).

Implementation Review

San Francisco Bay Area municipalities have implemented many measures to reduce formation of dioxins. A review of San Francisco Bay Area implementation of the measures listed in the Screening Evaluation was conducted for this report. This review provides a snapshot of activities in place in 2003 and it includes both activities associated with the Dioxins Project and activities conducted independently of the Dioxins Project. Pollution prevention activities for specific dioxin sources are discussed below.

San Francisco Bay Area municipal dioxins pollution prevention activities have been compiled in Appendix A. The compilation includes numerous examples of specific actions taken by specific cities and counties. Activity is so widespread that it was not possible to prepare a comprehensive inventory of actions. Table 2 summarizes the findings of the implementation review, by dioxins source and pollution prevention option. Appendix A provides a more detailed description of the activities summarized in Table 2. As can be seen in Table 2 (which starts on the following page) and Appendix A, P2 activities have been initiated for most of the dioxin sources identified in the screening evaluation. Several of the activities – particularly for 2,4-D and fireplaces – have built on

existing programs in the Bay Area. Other activities will benefit from the tools and resources developed by the Bay Area Dioxins Project.

Bay Area dioxins pollution prevention implementation provides a diverse set of examples that communities across the nation can use as models for their own activities.

Appendix C contains examples of municipal implementation of dioxins pollution prevention measures, including publications, case studies, and resolutions that initiated the dioxins pollution prevention efforts.

Table 2. Summary of Bay Area Municipality Implementation of Dioxins Pollution Prevention Options

Dioxins Source	Pollution Prevention Option	Implementation Status
2,4-D	Mechanical weed control	<ul style="list-style-type: none"> • Use of 2,4-D by municipalities and pest control professionals fell 27% between 1995 and 2001. • Municipal integrated pest management (IPM) programs are common. • IPM public education programs promote alternatives to 2,4-D.
	Other weed control pesticides	<ul style="list-style-type: none"> • See above. Most IPM programs allow use of least-toxic chemical weed control pesticides as a last resort.
Agricultural Burning	Non-burning alternatives	<ul style="list-style-type: none"> • Agricultural burning is severely restricted
Diesel Engines	Natural Gas	<ul style="list-style-type: none"> • Municipal compressed natural gas (CNG) vehicle ownership is widespread. • Some private fleets have CNG vehicles. • CNG fueling facilities are available. • Most bay area transit agencies selected cleaner diesel vehicles instead of natural gas. • Municipal clean vehicle policies are common.
	Biodiesel	<ul style="list-style-type: none"> • Biodiesel is available. • Some municipalities and private companies are using biodiesel or biodiesel blends.
	Oxydiesel	<ul style="list-style-type: none"> • None identified.
	Diesel engine retrofits	<ul style="list-style-type: none"> • State diesel plan will reduce dioxins emissions statewide. • Proposed ARB diesel rules would reduce municipal dioxins emissions. • Some municipalities have installed diesel engine retrofits.
	Reduce trips/change modes	<ul style="list-style-type: none"> • Measures to reduce diesel vehicle idling times are being implemented.
Drum Reclamation	Non-burning methods	<ul style="list-style-type: none"> • None identified.
Medical Waste	Non-incineration medical waste management methods	<ul style="list-style-type: none"> • The last bay area commercial medical waste incinerator closed; commercial autoclave treatment is now available in the bay area. • Many bay area hospitals are switching to autoclaving. • Municipalities and others are encouraging medical waste generators to use non-incineration medical waste management methods.

Dioxins Source	Pollution Prevention Option	Implementation Status
Medical Waste (Continued)	Reduce medical waste volumes	<ul style="list-style-type: none"> Many hospitals have pledged to reduce waste volumes.
	Eliminate medical PVC use	<ul style="list-style-type: none"> Many PVC alternatives are already available. Some medical suppliers are phasing out or reducing use of PVC. PVC use is decreasing because of concerns about the common additive diethylhexyl phthalate (DEHP). DEHP was listed in October 2003 as a 'reproductive toxicant' by Cal EPA. Many hospitals have reduced PVC purchasing.
Paper Bleaching	Process or totally chlorine free paper (PCF/TCF)	<ul style="list-style-type: none"> Some municipalities are purchasing PCF paper.
	Elemental chlorine free (ECF) paper	<ul style="list-style-type: none"> Essentially all paper purchased is ECF (if it is not PCF or TCF).
Pentachlorophenol	Non-wood alternative utility poles	<ul style="list-style-type: none"> Few changes have occurred.
	Different wood preservatives	<ul style="list-style-type: none"> Safer alternatives are available.
Petroleum Refining	Refining process modifications	<ul style="list-style-type: none"> One refinery implemented a project.
Polychlorinated Biphenyls (PCBs)	Remove from service	<ul style="list-style-type: none"> Upcoming regulatory requirements are likely to stimulate PCB removal actions.
Polyvinyl Chloride (PVC, "vinyl")	Non-PVC alternatives	<ul style="list-style-type: none"> Many green building programs address PVC alternatives. Resources exist to assist with selecting PVC alternatives for certain applications.
Wood Burning	BAAQMD model ordinance	<ul style="list-style-type: none"> Many Bay Area municipalities have adopted a fireplace ordinance.
	Natural gas fireplaces	<ul style="list-style-type: none"> Natural gas fireplaces are the primary substitute, if a fireplace is installed.
	U.S. EPA-certified wood stoves	<ul style="list-style-type: none"> All new wood stoves are U.S. EPA certified.
	"Better wood burning practices"	<ul style="list-style-type: none"> BAAQMD and ARB have wood burning education programs.
	No burning	<ul style="list-style-type: none"> BAAQMD's wood burning programs include "no burn" elements.

Institutionalization of Dioxins Pollution Prevention

Many San Francisco Bay Area municipal dioxins pollution prevention programs were initiated in a similar manner. In 1999 and 2000, several San Francisco Bay Area municipalities (including the City and County of San Francisco, County of Marin, the Cities of Oakland, Palo Alto and Berkeley, the Port of Oakland, and the Association of Bay Area Governments) adopted resolutions calling for dioxins pollution prevention and dioxins elimination. Each municipality has responded to its resolution – and community concerns about health and environmental effects of dioxins – uniquely. The individuality of municipal programs relates to the economic, political, and social differences among the municipalities, as well as to the cultures of each government organization.

For example, San Francisco implements programs primarily through the actions of its Department of the Environment. That Department facilitates and coordinates actions by other San Francisco Departments. San Francisco often puts its policies into ordinances to ensure implementation across all of the departments in its relatively large government. The Cities of Oakland, and Berkeley and the Port of Oakland also coordinate activities through their environmental departments; however, these organizations have used less formal methods (such as policies and staff coordination) to implement dioxins pollution prevention actions.

Unlike other Dioxins Project participants, Alameda County never passed a separate resolution addressing dioxins. Instead, its County Board of Supervisors adopted a broader policy on persistent, bioaccumulative toxins (PBTs). An Alameda County interdepartmental staff team developed a PBT reduction and elimination plan that includes dioxins pollution prevention as an integral element.

While Palo Alto has adopted a PBT resolution and several dioxins-related policies, its implementation of dioxins pollution prevention has occurred primarily under the auspices of its wastewater treatment plant, which anticipates future regulatory requirements to reduce dioxins in wastewater discharged to San Francisco Bay. Palo Alto has integrated dioxins pollution prevention measures into other initiatives like its Integrated Pest Management program (which is coordinated by an interdepartmental staff team) and the City Sustainability Program operated out of the City Manager's office.

Summary/Conclusions

As noted in the Implementation Review, pollution prevention targeting dioxins is widespread. Specifically,

- Bay Area government agencies are currently seeking to reduce dioxins releases associated with 10 of the 11 dioxins sources considered in the *Screening Evaluation of Dioxins Pollution Prevention Options*.
- Implementation of actions that reduce dioxins releases from 2,4-D use, diesel vehicle emissions, and wood burning is widespread among Bay Area municipalities.
- The vast majority of municipal dioxins pollution prevention actions have been institutionalized, either by incorporation into existing municipal programs, adoption

by ordinance, or inclusion in larger municipal policy initiatives. This makes continued implementation likely.

The Bay Area Dioxins Project has provided tools and resources that will facilitate implementation by municipalities of projects to reduce the use of chlorine bleached papers, PVC building materials, and diesel fuel vehicles. These actions should reduce the release of dioxins to the environment. In addition the projects provide tools that will assist hospitals in reducing the generation and release of dioxins resulting from medical waste management practices.

However, it is difficult to directly measure the impact of the Dioxins Project. This is due to lack of environmental data, time frame over which change will occur, and the variety of programs being conducted in the Bay Area that target dioxins.

A qualitative assessment of each of the project results is presented below. This assessment probably does not capture all of the benefits of the Bay Area Dioxins Project because the time frame over which municipalities and community members (like hospitals) will adopt policies and implement new dioxin pollution prevention strategies extends beyond the time frame of this project. In addition, attributing reductions solely to the Bay Area Dioxins Project is difficult because of the parallel efforts being conducted by other agencies and organizations in the Bay Area.

PCF Paper Purchasing

As noted in the implementation review, San Francisco, Alameda County and Palo Alto are purchasing significant amounts of PCF paper. The amount purchased by Alameda County is 5% of the total copy paper purchased by the County. For Palo Alto, in 2002, 100% of the letterhead, office paper, toilet paper, and paper towels purchased by the City were PCF paper. For budgetary reasons, the City switched to ECF office copy paper and toilet paper in 2003 but continues to purchase PCF letterhead and paper towels. Approximately 1.8% of the copy paper purchased by San Francisco is PCF paper. The tools developed through the PCF Paper Purchasing Demonstration Project will facilitate the process that other municipalities will go through to make the same switch to PCF paper. In addition to providing sample policies, purchasing specifications, and specific information on PCF paper suppliers, the project was also able to identify a reasonably priced approach to purchasing PCF paper through the RPPC purchasing pool.

PVC Building Alternatives

This project has consolidated and made available a variety of resources to assist municipalities with incorporating PVC alternatives into building projects. While specific reductions in the use of PVC are not quantifiable, three municipalities (San Francisco, Palo Alto, and Berkeley) have programs where PVC alternatives are being utilized in building projects. As specific projects near completion, quantities of PVC avoided could be measured but none of the projects is at a stage to facilitate this measurement.

Medical Waste Management

In the Bay Area, hospitals are subject to multiple pressures to rethink medical waste management methods:

- economic pressure, primarily from increasing waste management fees,
- political pressure, from environmental health advocates like Health Care Without Harm affiliates, and
- municipal pressure, primarily related to this project.

It is not currently possible to tease out the effect of the Bay Area Dioxins Project work from the effects of these other forces. However, colloquial information suggests that the trend is away from incineration and toward autoclaving of regulated medical waste, either on-site or at an off-site vendor location (primarily Stericycle's facility in San Leandro). On the basis of interviews with hospital and vendor staff and data from Alameda County's limited survey, it is possible to roughly estimate that between 25 and 50% of Bay Area hospitals now autoclave the majority of their regulated medical waste. Avoiding incineration of this waste (and the associated long-distance hauling of this waste to incinerators in Utah or Texas) may prevent as much as 0.5 to 1 gram of dioxins (TEQ, WHO-98) air emissions annually (see estimate found in Appendix B), actual value is probably lower). Comparison to the Bay Area Air Quality Management District's estimate of regional dioxins emissions (about 2 grams per year), one can see that a reduction of this order of magnitude is meaningful.

Diesel Fuel Alternatives

A variety of funding sources were identified by the Dioxins Project to purchase alternative fuel vehicles and, as noted in the implementation review, all the municipalities participating in the project have received grant funds to support diesel emissions reduction actions. Specifically all the participating municipalities have CNG vehicles. For example 20% of Palo Alto's vehicle feet operates on CNG and 50% of the Port of Oakland's airport ground fleet uses alternative fuels. More than 265 CNG vehicles were purchased in FY 2001-2003 by San Francisco Bay Area municipalities. In addition, several agencies including the Cities of Berkeley and Palo Alto and the San Francisco Airport have converted vehicles to biodiesel. Berkeley converted 90% of its vehicles to biodiesel in 2003. In 2002, approximately 11% of the diesel fuel purchased by Palo Alto was biodiesel.

Future Directions/Next Steps

Efforts to reduce dioxin releases to the environment are underway and are targeting a range of dioxin sources. Many Bay Area municipalities have demonstrated a commitment to dioxin pollution prevention through adoption of formal policies and implementation of specific actions. Future directions should focus on expanding existing programs, assisting agencies in initiating new efforts (e.g., getting more municipalities to replace diesel vehicles with clean-fueled vehicles) and developing information that would allow for quantification of reductions either indirectly through measurement of reduced

use of dioxin sources (e.g., paper, PVC, diesel, 2,4-D, etc.) or directly through air quality or water quality measurement.

Appendix A: Implementation Review

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options

Prevention Option	Bay Area Implementation	Notes
I. 2,4-D		
Mechanical weed control – implement an integrated pest management program for weed control.	<p>Use of 2,4-D by Municipalities and Pest Control Professionals Fell 27% between 1995 and 2001</p> <ul style="list-style-type: none"> • Use of pesticides by pest control professionals and employees of institutions like municipalities is reported to California Department of Pesticide Regulation (residential pesticide use is not reported). Reports show that 2,4-D use in the 9 Bay Area counties steadily declined from about 21,500 pounds in 1995 to 15,600 in 2001 (reported as pounds of the active ingredient itself). • San Francisco phased out use of 2,4-D in the mid-1990s; it has not used any 2,4-D since 1996. <p>Municipal IPM Programs are Common</p> <ul style="list-style-type: none"> • In response to community interest and urban runoff water quality permit requirements to implement integrated pest management (IPM), all municipalities in the Bay Area Dioxins Project and most other San Francisco Bay Area communities are in the process of establishing integrated pest management (IPM) programs that include use of non-toxic and least toxic pest control as the preferred method of pest control at municipal facilities. • Numerous local government IPM programs exist in the Bay Area. Both San Francisco's and Palo Alto's programs have been recognized for their excellence by the California Department of Pesticide Regulation, which gave both programs its "IPM Innovator" award. • Alameda County adopted an IPM resolution in 2000. <p>IPM Public Education Programs Promote Alternatives to 2,4-D</p> <ul style="list-style-type: none"> • Most Bay Area municipalities are participating in regional IPM pest education programs sponsored by water quality agencies. The regional "Our Water/Our World" program sponsored by Bay Area wastewater and stormwater agencies includes a lawn care fact sheet that promotes non-toxic and least toxic alternatives to 2,4-D for broadleaf weed control. IPM workshops were conducted by Alameda, Contra Costa, and Santa Clara Counties in 2003. 	See Screening Evaluation pages 13 and A-1 to A-3

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
Other weed control pesticides – switch to another pesticide.	See above. Most IPM programs allow use of least-toxic chemical weed control pesticides as a last resort.	The primary alternatives that municipalities are employing to replace 2,4-D are non-chemical. See Screening Evaluation pages 13 and A-3 to A-4
II. Agricultural Burning		
Non-burning alternatives – use non-burning methods to manage fields and orchards.	Agricultural Burning is Severely Restricted <ul style="list-style-type: none"> The Bay Area Air Quality Management District (BAAQMD) regulates burning of agricultural fields within the San Francisco Bay Area. Its regulations limit the types and timing of agricultural burning. 	See Screening Evaluation pages 14 and A-4 to A-5
III. Diesel Engines	In June 2002, the Bay Area Dioxins Project published the memorandum “Funding for Municipal Diesel Vehicle Fuel Conversion or Replacement with Alternative Fuel Vehicles” to address the primary barrier to diesel dioxins emission reduction identified by Dioxins Project municipalities. All Dioxins Project municipalities have recently received grant funds to support diesel emissions reduction actions.	See Screening Evaluation pages 14 to 16, and A-5 to A-16
Natural Gas – replace diesel engines with natural-gas engines. Replacements can burn 100% natural gas or a majority of natural gas and a small amount of diesel. Most vehicles use compressed natural gas (CNG).	Municipal CNG Vehicle Ownership is Widespread <ul style="list-style-type: none"> All municipalities participating in the Bay Area Dioxins Project have some heavy-duty CNG vehicles in their fleets. For example, about 20% of Palo Alto’s vehicle fleet (a total of 70 light and heavy duty vehicles) operates on CNG and 50% of the Port of Oakland’s airport ground fleet uses alternative fuels (some of the more than 17 CNG vehicles are heavy-duty vehicles). Many San Francisco Bay area municipalities operate one or more fleet vehicles on CNG on either a trial or a permanent basis. The Bay Area Air Quality Management District is providing partial funding for municipal CNG vehicles through its Transportation Funds for Clean Air (TFCA) Grant program. In FY 2001-2003, Bay Area municipalities purchased at least the following CNG vehicles: 	See Screening Evaluation pages 15 and A-12 to A-15

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
Natural Gas (Continued)	<ul style="list-style-type: none"> ○ Alameda County - 12 Natural Gas Refuse Trucks, 1 Street Sweeper ○ Berkeley - 7 Refuse Trucks, 1 Mini-Bus ○ Contra Costa County - 1 Medium Duty Truck ○ Evergreen Elementary School District - 6 School Buses ○ Fremont - 2 Street Sweepers ○ New Haven Unified School District - 3 School Buses ○ Oakland - 27 Refuse Trucks ○ Petaluma – 4 buses ○ Presidio Trust – 5 Shuttle Buses ○ San Francisco – 18 Trucks ○ San Francisco Airport – 4 Buses, 31 Shuttles, 34 Mini-Buses ○ San Francisco MUNI- 15 Buses ○ San Jose –15 Shuttle Buses ○ San Mateo Union High School District – 3 School Buses ○ Sausalito – 1 Shuttle Bus ○ Solano Transportation Authority – 1 Bus ○ Sonoma County Transit – more than 40 Buses, 4 Refuse Trucks ○ Sunnyvale – 29 Refuse Trucks ○ Sunnyvale School District – 1 School Bus ○ Union City – 1 Street Sweeper, 2 Transit buses <ul style="list-style-type: none"> • More than 20% of Bay Area school buses operate on CNG. The BAAQMD Lower-Emission School Bus Program helps school districts buy new natural gas, propane, or electric-powered buses and by retrofitting old diesel school buses with particulate matter control devices. The Lower-Emission School Bus Program has funded 125 bus replacements (all are alternative fuel buses, primarily CNG). <p>CNG Fueling Facilities are Available</p> <ul style="list-style-type: none"> • All of the municipalities participating in the Bay Area Dioxins Project have CNG fueling facilities. • The Bay Area has more than 30 CNG fueling facilities. PG&E and municipalities operate the facilities. In FY 2001 – 2003 BAAQMD TFCA provided partial funding for installation of CNG fueling facilities in San Francisco, Union City, Alameda County, San Jose Airport and Palo Alto. 	

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
Natural Gas (Continued)	<p>Some Private Fleets Have CNG Vehicles</p> <ul style="list-style-type: none"> Some private companies are moving to CNG vehicles in response to public health pressures relating to operation of loading facilities with diesel vehicles. For example, Safeway/Vons, Ralph's Grocery and Albertson's have added 150 alternative fuel trucks to their fleets. Private garbage companies serving several Bay Area cities including Oakland, Sunnyvale, San Francisco, San Jose, Santa Rosa, and Dublin have one or more natural gas refuse trucks. San Francisco's waste management company (Norcal) is converting all 38 of its "long haul" vehicles (trucks that carry San Francisco's waste to a landfill in Alameda County) to Liquefied Natural Gas (LNG). <p>Most Bay Area Transit Agencies Selected Cleaner Diesel Vehicles instead of Natural Gas</p> <ul style="list-style-type: none"> In response to ARB requirements for transit fleets to select a "path" to transition to cleaner vehicles, most Bay Area transit agencies (which together operate about 2,200 buses) selected the lower-emissions diesel path instead of the natural gas path. This path will reduce diesel particulate emissions by 85% by 2007. Substantial dioxins reductions are also expected (but no dioxins data are available). A few agencies have selected natural gas, eliminating dioxins emissions. For example, Sonoma County Transit is converting its entire bus fleet to natural gas. <p>Municipal Clean Vehicle Policies are Common</p> <ul style="list-style-type: none"> Many Bay Area municipalities have clean fuel vehicle policies, including Contra Costa, San Francisco, and San Mateo Counties; and the cities of Belvedere, Berkeley, Campbell, Cupertino, Fairfax, Los Gatos, Mill Valley, Morgan Hill, Palo Alto, Petaluma, San Anselmo, San Mateo, Sausalito, Sonoma, and Sunnyvale. Palo Alto has an alternative fuels policy under which the City reviews all vehicle and equipment purchases to consider whether they can be operated on CNG or electrical power instead of gasoline or diesel. San Francisco Airport is implementing a fee structure intended to provide incentives for all airport vehicle operators (like shuttles and taxis) to use alternative fuels. The airport set a goal of 100% clean vehicle operations (including tenant vehicles and airport-owned vehicles) as part of its December 1999 Clean Vehicle Policy. 	

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
<p>Biodiesel – use biodiesel as a substitute for diesel fuel in existing engines. Biodiesel can be used without modifying engines or fueling infrastructure. Biodiesel is a fuel made from vegetable oils or animal fats.</p>	<p>Biodiesel is Available</p> <ul style="list-style-type: none"> • Municipalities seeking to purchase biodiesel have found biodiesel suppliers. • A few retail outlets exist, for example Western States Oil in San Jose, Mountain View Valley Oil in Mountain View, and Naft Gas in Fairfax. A San Francisco biodiesel retail outlet that sold biodiesel to both regular retail and commercial customers closed. Retail outlets are planned in San Francisco and Berkeley. <p>Some Municipalities and Private Companies are Using Biodiesel or Biodiesel Blends</p> <ul style="list-style-type: none"> • Several San Francisco Bay Area government agencies and businesses have tested or are using biodiesel, including the City of Berkeley, San Francisco International Airport, and the City of Palo Alto. • Berkeley converted 180 of its 200 vehicles to 100% biodiesel (“B100”) in 2003 (conversion of the remaining vehicles—all fire trucks—is planned when provisions for fuel delivery can be made). • Palo Alto converted its landfill vehicles, its golf course vehicles and its street sweepers to 20% biodiesel (“B20”). In 2002, 11.4% (about 17,000 gallons) of Palo Alto’s diesel fuel purchases were biodiesel. • Private entities using biodiesel include San Jose’s refuse company (Green Team), which converted 95 vehicles to biodiesel, and Palo Alto’s refuse company (PASCO), which uses B20 to fuel its entire fleet. Berkeley’s residential curbside recycling contractor (the Ecology Center) operates all 10 of its trucks on biodiesel. • The City of Oakland is participating in a biodiesel collaborative. The collaborative brings biodiesel producers, biodiesel distributors and biodiesel researchers together with those running diesel trains, city and commercial fleets. Through the collaborative, Oakland helped a private school bus contractor serving Oakland schools initiate use of biodiesel in spring 2003. 	<p>See Screening Evaluation pages 15 and A-5 to A-9</p>

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
Oxydiesel – use oxydiesel to fuel existing diesel engines. Oxydiesel can be used without modifying engines or fueling infrastructure. Oxydiesel is ordinary diesel fuel, modified with the addition of fuel oxygenates like ethanol.	None identified.	Oxydiesel products have not been marketed to any great extent in the Bay Area. Fleets appear to be testing and adopting biodiesel instead. See Screening Evaluation pages 16 and A-9 to A-10
Diesel engine retrofits – retrofit existing diesel engines to reduce particulate formation during engine operation. Various types of retrofits are available; from add-on devices to engine “repower” retrofits.	<p>State Diesel Plan will Reduce Dioxins Emissions Statewide</p> <ul style="list-style-type: none"> In 2000, the California Air Resources Board (ARB) adopted the <i>Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles</i>. This Plan will be implemented with a set of rules that the ARB is in the process of adopting. The planned rules will require that new diesel vehicles have lower emissions and that existing diesel vehicles be retrofitted to reduce emissions. In implementing the plan, the ARB intends to reduce particulate emissions from California’s 1.2 million diesel vehicles by 75 percent by 2010. The dioxins emissions reduction from this plan is unknown, but is likely to be significant. <p>Proposed ARB Diesel Rules would Reduce Municipal Dioxins Emissions</p> <ul style="list-style-type: none"> The ARB is in the process of adopting requirements for vehicle fleet owners to retrofit or replace on-road and off-road diesel engines to reduce pollutant emissions. Rules for municipal fleets (including contract fleets) and solid waste collection fleets are planned for adoption in 2003 and 2004. The ARB has planned full phase-in of the requirements by 2010. While these planned rules do not directly target dioxins, substantial dioxins emissions reductions are likely. The ARB urban transit rule requires transit fleets to transition to cleaner vehicles. Most San Francisco Bay Area transit agencies decided to pursue the diesel “path” (see above). 	See Screening Evaluation pages 16 and A-10 to A-12

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
Diesel engine retrofits (Continued)	Some Municipalities have Installed Diesel Engine Retrofits <ul style="list-style-type: none"> The BAAQMD Lower-Emission School Bus Program has funded 29 diesel school bus retrofits. San Francisco is in the process of retrofitting its newer MUNI transit buses with particulate traps. It plans to repower diesel engines in older buses. The Alameda County Public Works Agency plans to retrofit 13 diesel vehicles with particulate traps. 	
Reduce trips/change modes – switch to other methods of transferring goods and people and reduce idling times and avoid heavy acceleration.	Measures to Reduce Diesel Vehicle Idling Times are Being Implemented <ul style="list-style-type: none"> The ARB recently adopted a requirement that strictly limits diesel vehicle idling near schools. It is considering additional restrictions on diesel vehicle idling. San Francisco Traffic Code Article 3, Section 60.5 prohibits motor coach (bus) idling for more than 5 minutes unless the bus is loading or unloading passengers. Transit Bus Signal Prioritization projects are being implemented in several regions, including San Francisco, the Santa Clara Valley, and Fairfield. Such measures reduce idling times for diesel-fueled buses. Safety/Vons, Ralphs Grocery and Albertson's have agreed (as part of a Proposition 65 lawsuit settlement) to modify their trucks so that they idle for no more than 3 minutes at a time (San Francisco Chronicle, April 2000). Alameda County has a "buy local" purchasing policy that has the effect of reducing the length of diesel vehicle trips used to haul County-purchased materials and supplies to County facilities. 	Trip reduction activities have generally focused on light-duty vehicle trips. See Screening Evaluation pages 16 and A-15 to A-16
IV. Drum Reclamation		
Non-burning methods – change drum reclamation practices from those involving furnaces to use of caustics and solvents ("drum washing") and physical cleaning methods.	None identified	See Screening Evaluation pages 17 and A-16 to A-17

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
V. Medical Waste		
Non-incineration medical waste management methods – switch to an alternative disposal method such as autoclaving, chemical disinfection, sterilization, or microwaving.	<p>The Last Bay Area Commercial Medical Waste Incinerator Closed; Commercial Autoclave Treatment is Now Available in the Bay Area</p> <ul style="list-style-type: none"> The commercial medical waste incinerator in Oakland closed in December 2001. This was the last commercial medical waste incinerator in California. Regulated medical waste taken off-site for incineration is now hauled to Utah or Texas. In early 2002, Stericycle opened an off-site regulated medical waste autoclaving facility in San Leandro. Stericycle began an effort to encourage customers to switch from incineration to autoclaving of regulated medical waste not requiring incineration (a few percent of the waste must be incinerated under current California law). <p>Many Bay Area Hospitals are Switching to Autoclaving</p> <ul style="list-style-type: none"> At least 15 of the approximately 100 general acute care hospitals in the Bay Area autoclave their medical waste on site. For example, essentially all Kaiser Permanente hospitals autoclave on site (there are 13 Kaiser hospitals in the Bay Area). Other hospitals—like Saint Mary’s Medical Center in San Francisco, Alta Bates Summit Medical Center in Oakland, and Stanford University’s hospitals in Palo Alto have autoclaved on site for years, or have switched from off-site incineration to on-site autoclaving. Most Bay Area hospitals ship regulated medical waste off-site for management. Although specific numbers are not available, on the basis of increased operations at the San Leandro autoclaving facility, a meaningful fraction of Bay Area hospitals and other regulated medical waste generators (like laboratories, medical offices, and dentists) have switched from incineration to autoclaving. 	See Screening Evaluation pages 18 and A-19 to A-22

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
Non-incineration medical waste management methods (Continued)	<p>Municipalities and Others are Encouraging Medical Waste Generators to Use Non-Incineration Medical Waste Management Methods</p> <ul style="list-style-type: none"> In June 2003, the Bay Area Dioxins Project completed a set of materials for hospitals evaluating management options other than incineration for their regulated medical waste. The packet includes a background fact sheet, a set of frequently asked questions, an autoclave vendor list, a summary of permit requirements for installing autoclaves at acute care hospitals, a list of resources for health care pollution prevention, and an interactive cost estimating worksheet for on-site autoclave operations. Dioxins Project municipalities are working individually to share this information with their local hospitals. The ongoing Health Care Without Harm campaign has stimulated hospitals to change medical waste management practices (www.noharm.org). 	
Reduce medical waste volumes – implement source reduction and waste diversion from the medical waste stream to the solid waste stream.	<p>Many Hospitals Have Pledged to Reduce Waste Volumes</p> <ul style="list-style-type: none"> About 37 of the approximately 100 Bay Area hospitals have pledged to reduce their waste volumes as part of their participation in “Hospitals for a Healthy Environment” (H2E). H2E is a voluntary program designed to help health care facilities enhance work place safety, reduce waste and waste disposal costs and become better environmental stewards and neighbors. Originally a partnership between the American Hospital Association and U.S. EPA, H2E now involves additional partners like the American Nurses Association and Health Care Without Harm. H2E has a goal of reducing medical waste volumes (both solid and regulated medical waste) by 50% by 2010. Six Bay Area Hospitals reduced regulated medical waste volumes while participating in the Healthcare P2 project. U.S. EPA, the California Department of Health Services, Cal-EPA, Contra Costa County, Alameda County, Health Care Without Harm, Labor Organizations, other healthcare industry, community, environmental group representatives have worked together to carry out 6 multimedia pilot assessments of hospitals in the Bay Area, and to promote implementation of identified pollution prevention options (including medical waste reduction actions). 	See Screening Evaluation pages 18 and A-17 to A-19

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
<p>Eliminate medical PVC use – substitute non-PVC alternatives for many medical devices, such as IV bags, patient ID bracelets, and gloves and sheeting.</p>	<p>Many PVC Alternatives are Already Available</p> <ul style="list-style-type: none"> • Health Care Without Harm (www.noharm.org) published a list of alternatives to PVC medical devices, which has specific product information for PVC-free alternatives for medical devices that are commonly made of PVC (such as IV bags, various types of tubing, and catheters). • The Sustainable Hospitals Project provides resources for identifying and purchasing PVC-free medical products (www.uml.edu/centers/lcsp/hospitals). • The Healthy Building Network offers assistance to health care institutions to develop PVC-free construction specifications. (www.healthybuilding.net/healthcare/index.html) <p>Some Medical Suppliers are Phasing Out or Reducing Use of PVC</p> <ul style="list-style-type: none"> • Health Care Without Harm has negotiated agreements to phase out use of PVC with Baxter International, Universal Health Services, and Tenet and its group purchasing organization BuyPower. • Premier, a hospital group purchasing organization, issued a request for proposals that requires bidders to provide alternatives to PVC medical equipment. • Some hospitals have requests for PVC content and/or requests for vendors to identify PVC-free products in bid specifications (e.g., Catholic Healthcare West and Kaiser Permanente). <p>PVC Use is Decreasing Because of Concerns about the Common Additive Diethylhexyl Phthalate (DEHP). DEHP was listed in October 2003 as a ‘reproductive toxicant’ by Cal EPA.</p> <ul style="list-style-type: none"> • California Healthcare Association (CHA) and the California Medical Association (CMA) have issued a joint letter advising their respective members to consider using alternatives to products that contain DEHP (a phthalate plasticizer used to make PVC medical equipment flexible) in the treatment of male neonates. • In October 2003, California's Office of Environmental Health Hazard Assessment listed DEHP as a reproductive toxin under California's Proposition 65. Although this listing only requires that persons exposed to DEHP receive risk warnings, the practical effect of such listings is almost always a significant reduction in use of products associated with exposures to listed chemicals. Since most PVC medical care products contain DEHP, the listing is very likely to reduce use of PVC in health care. 	<p>See Screening Evaluation pages 19 and A-22 to A-23</p>

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
Eliminate medical PVC use (Continued)	<p>Many Hospitals have Reduced PVC Purchasing</p> <ul style="list-style-type: none"> • Catholic Healthcare West (which has 7 Bay Area hospitals) is reducing its use of PVC, with the intent of eventually phasing it out altogether. Catholic Healthcare West has asked its suppliers to work to develop non-PVC alternatives for the various PVC products they are still required to use. • John Muir Medical Center in Walnut Creek has reduced use of PVC in its neo-natal intensive care unit (NICU) in its effort to avoid exposing infants to DEHP, which is in many PVC products. • Kaiser Permanente is switching all its hospitals (including its 13 Bay Area facilities) to non-PVC/DEHP products for three commonly used NICU devices: umbilical vessel catheters, peripherally inserted central catheter lines and enteral feeding products. As a follow-up to the process, Kaiser Permanente engaged in a discussion with its supplier, Baxter International, Inc., to conduct an analysis of Baxter's products and to focus on other non-DEHP containing Baxter products that could be adapted for NICU use. • Kaiser Permanente established a latex-safe, national standard for medical exam gloves, resulting in a reduction of 43 million PVC gloves from annual use and disposal. • The Health Care Without Harm campaign is working to stimulate hospitals to change PVC purchasing practices. This campaign is supported by resolutions calling for the phase out of PVC in medical products that have been adopted by many medical and health associations. 	
VI. Paper Bleaching	<p>In May 2002, the Bay Area Dioxins Project completed a packet of resources for municipalities seeking to purchase chlorine-free paper. The packet includes "Getting Started on Chlorine-Free Paper Purchasing" (a set of frequently asked questions), example environmentally preferable paper purchasing policies, example specifications for chlorine-free paper purchasing, and other tips and resources. The Dioxins Project identified specific chlorine-free copy paper products available to Bay Area municipalities and obtained pricing for those products (see "Cooperative Purchasing Opportunities for Buying PCF Copy Paper", May, 2002).</p>	<p>See Screening Evaluation pages 19 and A-23 to A-28</p>

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
Process or totally chlorine free paper – purchase process chlorine free (PCF) recycled paper or totally chlorine free (TCF) non-recycled paper products. This analysis focuses on PCF paper since most participating municipalities prefer recycled paper.	Some Municipalities are Purchasing PCF Paper <ul style="list-style-type: none"> After testing various paper supplies and developing a purchasing specification for 100% recycled PCF papers (including office papers and sanitary papers), the City of Palo Alto switched to PCF letterhead and office paper (about 17,000 reams a year),⁴ hand towels, and toilet paper. Alameda County purchased 100% recycled PCF paper for office uses. In the 14 month period from July 2001 through September, 2002, it purchased 9367 reams of 100% recycled PCF paper. The City of Berkeley is investigating a purchasing policy requiring 100% recycled content, chlorine free paper. About 1.7-1.8% of San Francisco's office paper (about 3,500 reams per year) is 100% recycled PCF paper. 	See Screening Evaluation pages 20 and A-25 to A-28
Elemental chlorine free (ECF) – purchase ECF paper products (products bleached with chlorine dioxide).	Essentially All Paper Purchased is ECF (if it is not PCF or TCF) <ul style="list-style-type: none"> In response to U.S. EPA regulations, almost all manufacturers have switched to ECF processes. This means that it is reasonable to assume that 100% of Bay Area municipal paper purchases that are not PCF or TCF are ECF. Canadian manufacturers have also switched to ECF. These changes mean that purchasing preferences for ECF paper are not useful. 	See Screening Evaluation pages 20 and A-23 to A-25

⁴ Due to a budget shortfall, Palo Alto began to purchase less expensive non-PCF office paper temporarily in 2003.

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
VII. Pentachlorophenol		
Non-wood alternative utility poles – purchase utility poles made of steel, fiberglass, concrete, or another non-wood material or move utilities underground.	<p>Few Changes have Occurred</p> <ul style="list-style-type: none"> • Undergrounding is the primary alternative being pursued by utilities and municipalities. Cost limits the number of undergrounding projects in Bay Area municipalities. • U.S. EPA is currently reviewing the pesticide registration that allows pentachlorophenol to be used in the United States. Such a review has the potential to restrict or eliminate use of pentachlorophenol. • The San Francisco passed a resolution urging owners of utility poles in San Francisco to search for alternatives to pentachlorophenol and to cover the first five feet above ground level of all existing chemically treated wood poles located within 100 feet of any elementary school, park, or day care center. As a follow-up to this resolution, San Francisco and Pacific Gas & Electric (PG&E) hosted a one day workshop on alternatives to pentachlorophenol-treated utility poles. The workshop included representatives from the local telephone company (Pacific Bell, now SBC); the wood preserving industry; and wood, steel, concrete, and fiberglass pole manufacturers. At the workshop, manufacturers and utility representatives reviewed the strengths and weaknesses of the alternative products. 	<p>Only a few Bay Area municipalities manage their own utility poles; most are owned and managed by private utilities (primarily PG&E).</p> <p>See Screening Evaluation pages 21 and A-28 to A-31</p>

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
Different wood preservatives – purchase utility poles treated with other wood preservatives (e.g., creosote, chromated copper arsenate [CCA], and “ammoniacal copper quat” [ACQ]).	Safer Alternatives are Available <ul style="list-style-type: none"> San Francisco has adopted regulations for its own purchase of wood preservatives that specify criteria to address many of the adverse environmental effects of wood preservatives. One of the criteria is “[p]roduct may not result in the release or creation of dioxins during manufacture or disposal.” A technical study reviewing wood preservatives prepared to support the regulations found that copper naphthenate is the environmentally preferable wood preservative for utility poles. 	The primary alternatives (CCA and creosote) also have significant environmental concerns. See Screening Evaluation pages 22 and A-31 to A-33
VIII. Petroleum Refining		
Refining process modifications – specific pollution prevention actions would need to be determined.	One Refinery Implemented a Project <ul style="list-style-type: none"> Evergreen Oil of Newark, CA has modified its process waste management/energy production system to eliminate a process that may create dioxins. A re-refinery for used oil, Evergreen historically burned a chlorine-containing volatile fraction of the waste oil it receives as an energy source. The combustion of this waste stream was eliminated at the site, and the material is now being collected for off-site waste management. Evergreen Oil has also planned to add a process to reduce the chlorine content of its fuels. 	Possible pollution prevention actions have not been specifically identified. See Screening Evaluation pages 22 and A-33 to A-34

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
IX. Polychlorinated Biphenyls (PCBs)		
Remove from service – identify and replace PCB-containing materials.	<p>Upcoming Regulatory Requirements are likely to Stimulate PCB Removal Actions</p> <ul style="list-style-type: none"> The upcoming San Francisco Bay Regional Water Quality Control Board PCB Total Maximum Daily Load (TMDL) is likely to stimulate municipal activities to prevent PCB releases and to identify and clean up outdoor areas with elevated PCB levels. The City of Oakland has been awarded a \$460,000 grant by the State Water Resources Control Board to investigate and abate PCB-contaminated sediments collecting in the storm drain system. The grant will also [delete extra space]pay for outreach to business owners and creation of a project case study. 	See Screening Evaluation pages 23 and A-35 to A-37
X. Polyvinyl Chloride (PVC, “vinyl”) [Note: medical PVC use is in Section V]	In May 2002, the Bay Area Dioxins Project completed a packet of resources for municipalities on alternatives to PVC in building materials. The packet includes “Incorporating Alternatives to PVC in Buildings” (a set of frequently asked questions) and documents describing specific PVC alternatives.	
Non-PVC alternatives – specify and purchase PVC-free materials and products for building construction, interior furnishing, packaging, office supplies, and vehicle parts.	<p>Many Green Building Programs Address PVC Alternatives</p> <ul style="list-style-type: none"> A common component of “green building” projects is to avoid use of PVC-containing construction and interior finishing materials. For example, when the City of San Francisco remodeled office space for the Department of the Environment’s office, it employed a “green building” approach that included alternatives to many products that are typically made with PVC. To implement local ordinance requirements to obtain non-PVC plastics where appropriate alternative products composed of non-chlorinated materials are available, San Francisco is continuing to explore PVC alternatives in its 10 green building pilot projects. Palo Alto’s green building program encourages selection of environmentally safe building materials and discourages use of plastics, including vinyl flooring. The City of Berkeley Green Building Initiative seeks to remove barriers to green construction and to promote green building for all new construction projects. Berkeley’s green building program is currently involved in 4 green building projects, including two City facilities (Civic Center remodeling and Shorebird Nature Center) that are employing PVC alternative construction materials. 	See Screening Evaluation pages 24 and A-37 to A-40

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
Non-PVC alternatives (Continued)	Resources Exist to Assist with Selecting PVC Alternatives for Certain Applications <ul style="list-style-type: none"> The Healthy Building Network (www.healthybuilding.net) has extensive information about PVC-free building materials. Several product specification guides exist that offer details on PVC alternatives – for example, the Environmental Building News Green Spec Binder and Directory and the Architects/Designers/Planners for Social Responsibility Northern California Chapter Architectural Resource Guide. 	See Screening Evaluation pages 25 to 26 and A-40 to A-51
XI. Wood Burning		
BAAQMD model ordinance – adopt prohibitions on new open fireplaces, burning of problem fuels, and burning on “Spare the Air” nights.	Many Bay Area Municipalities Have Adopted a Fireplace Ordinance The following Bay Area municipalities have adopted all or substantial portions of the BAAQMD model ordinance: <ul style="list-style-type: none"> <u>Counties</u>: Alameda, Contra Costa, Marin, San Francisco, San Mateo, and Santa Clara. <u>Cities</u>: Berkeley, Campbell, Dublin, Foster City, Fremont, Livermore, Los Altos, Los Gatos, Menlo Park, Milpitas, Moraga, Morgan Hill, Mountain View, Palo Alto, Petaluma, San Jose, Santa Clara, Santa Rosa, Saratoga, Sebastopol, Sunnyvale, Union City, and Windsor. 	See Screening Evaluation pages 26 and A-44 to A-46
Natural gas fireplaces – install natural gas fireplaces instead of traditional fireplaces.	Natural Gas Fireplaces are the Primary Substitute, if a Fireplace is Installed <ul style="list-style-type: none"> In municipalities where new wood-burning fireplaces are prohibited, gas fireplaces are allowed. Encouraging gas substitutes or retrofits is part of most of the educational and regulatory programs described in this section. 	See Screening Evaluation pages 25 and A-46 to A-47

Bay Area Municipality Implementation of Dioxins Pollution Prevention Options (Continued)

Prevention Option	Bay Area Implementation	Notes
U.S. EPA-certified wood stoves – install certified stoves instead of fireplaces or non-certified wood stoves.	All New Wood Stoves are U.S. EPA Certified <ul style="list-style-type: none"> It has been a Federal requirement for vendors to sell only U.S. EPA-certified wood stoves since 1992. The BAAQMD model ordinance (and many municipal ordinances) does not permit installation of wood fireplaces or wood stoves that are not U.S. EPA certified. 	Neither the Federal law nor the local ordinances include any retrofit provisions, so wood-burning stoves installed prior to 1992 may not meet current U.S. EPA certification standards. See Screening Evaluation pages 25 and A-41 to A-44
“Better wood burning practices” – educate the community regarding burning habits.	BAAQMD and ARB have Wood Burning Education Programs <ul style="list-style-type: none"> Some Bay Area municipalities are distributing BAAQMD and ARB information. Palo Alto has been conducting an educational campaign (including elements like utility bill inserts and movie theater ads) to promote better burning practices and to educate residents about the environmental problems from wood burning. San Francisco is coordinating with the BAAQMD to promote the “Spare the Air Tonight” wood burning reduction education program. Actions include placing a “Don’t Light Tonight” banner over the mid-Bay Bridge tunnel through Yerba Buena Island and placing articles in neighborhood newspapers. 	U.S. EPA evaluated dioxins emissions from various types of Bay Area firewood and manufactured fire logs, finding no meaningful dioxins emissions differences among the tested fuels. See Screening Evaluation pages 26 and A-49 to A-51
No burning – implement burn bans.	BAAQMD’s Wood Burning Programs Include “No Burn” Elements <ul style="list-style-type: none"> Outdoor residential garbage burning is already prohibited by the BAAQMD. BAAQMD’s voluntary “Spare the Air Tonight” program asks residents not to use fireplaces when air pollution levels are elevated. 	See Screening Evaluation pages 26 and A-48 to A-49

Source: San Francisco Bay Area municipality, state government, and reliable private organization publications, Internet sites, and staff.

Appendix B: Estimate of Dioxins Releases Associated with Incineration of Medical Waste from San Francisco Bay Area Hospitals

Estimate of Dioxins Releases Associated with Incineration of Medical Waste from San Francisco Bay Area Hospitals

Note: The purpose of this estimate is to give an order of magnitude to the dioxins emissions reductions that are being achieved by changes in medical waste management practices. This estimate is based on many assumptions and approximations. The most uncertain elements of the estimate are the dioxins emissions factors, obtained from U.S. EPA's dioxins inventory database. Since these factors are based on data highly varied sources (some of which lack the emissions control present on modern off-site medical waste incinerators), it is possible—and, in fact likely—that actual emissions from the incinerators receiving Bay Area medical waste are lower than the estimates presented below.

A. Estimated Medical Waste Volume

Number of Bay Area Hospitals = 101

(Source: Hospital contact list prepared by the Center for Environmental Health, 2001)

Average annual medical waste volume for one hospital = 22,800 Kg

(Source: average of quantities of medical waste generated by Alameda County hospitals, data from 2001 for 17 of 19 Alameda County hospitals, compiled by Ann Melamed, CEH, 2001).

Estimated annual medical waste volume for all Bay Area hospitals = 2,300,000 Kg

(Source: multiplication of above values)

B. Maximum Dioxins Emissions from Bay Area Medical Waste Incineration

Note: This calculation gives the maximum dioxins emissions, if all of the above regulated medical waste were incinerated

Emissions factor for medical waste incineration = 841 ng/Kg of medical waste (TEQ, WHO-98)

(Source: U.S. EPA, Database of Sources of Environmental Releases of Dioxin-like Compounds in the United States (Version 2.0) Reference Years 1987 and 1995, EPA/600/C-01/012, March 2001.)

Maximum Annual Dioxins Emissions if all Bay Area medical waste were incinerated = 1.9 grams

(Source: Multiplication of waste volume from A. by emissions factor)

C. Maximum Dioxins Emissions from Hauling Bay Area Medical Waste for Incineration

Note: This calculation gives the maximum dioxins emissions, if all of the above regulated medical waste were incinerated. It assumes that all waste would be hauled from San Leandro (the only medical waste transfer station in the Bay Area) to North Salt Lake, Utah (location of the Stericycle incinerator), and that

trucks would return empty to California. Waste hauled to Texas would have a longer hauling distance.

Estimated volume of medical waste per diesel hauling truck = 16 tons (14,500 Kg)

(Source: typical waste hauling truck volume)

Number of truck round trips = 158

(Source: Waste quantity from A. divided by truck capacity)

Hauling Distance (San Leandro to North Salt Lake Utah, one way) = 1197 km

(Source: CSAA Internet Trip Tik trip length estimate)

Annual Bay Area Medical Waste Diesel truck driving distance = 379,000 km

(Source: Multiplication of hauling distance by 2 (round trip) and then by number of truck trips)

EPA Emissions factor for diesel trucks = 182 pg/km

(Source: U.S. EPA, Database of Sources of Environmental Releases of Dioxin-like Compounds in the United States (Version 2.0) Reference Years 1987 and 1995, EPA/600/C-01/012, March 2001.)

Maximum Annual Dioxins Emissions from Medical Waste Hauling Trucks if all Bay Area medical waste were hauled to Utah for incineration = 0.00007 g

Note for all calculations: The accuracy of these calculations merits only one significant figure. Additional significant figures are included in calculations to avoid propagation of rounding error.

Appendix C: Examples of Municipal Implementation of Dioxins Pollution Prevention Measures

List of Examples

2,4-D Alternatives

Central Contra Costa Sanitary District, "Tips for a Healthy Beautiful Lawn," prepared for the San Francisco Bay Area regional "Our Water, Our World" IPM Education campaign by San Francisco Bay Area water quality agencies, January 2001.

City and County of San Francisco, "Getting Past Pesticides: Integrated Pest Management in San Francisco," brochure, undated.

Diesel Alternatives

Alameda County, "Alameda County Public Works Agency Clean Air Vehicle Projects," Case Study, 2002.

California Air Resources Board, "California's Plan to Reduce Diesel Particulate Matter Emissions," Fact Sheet, October 2000.

City and County of San Francisco, Clean Air Ordinance, City and County Of San Francisco Administrative Code, Chapter 85, "Healthy Air and Smog Prevention", Police Code Article 42B, July 15, 1999.

City of Berkeley, City of Berkeley Converts Fleet to 100 Percent Biodiesel, Press Release, June 19, 2003.

City of Palo Alto, "Alternative Fuel Vehicle Policy," undated.

City of Palo Alto, "City of Palo Alto Pilots Biodiesel Fuel at Landfill and Golf Course," Case Study, 2002.

Port of Oakland, "Port of Oakland Vision 2000 Maritime Development Program – Air Quality," Case Study, 2002.

San Francisco International Airport, "SFO's Commitment to Clean Air Vehicles," Fact Sheet, June 2003.

Medical Waste Management Alternatives

Hospitals for a Healthy Environment, "Regulated Medical Waste Reduction: 10 Steps to Implementing a Regulated Medical Waste Reduction Plan," Fact Sheet, undated.

Hospitals for a Healthy Environment, "Case Study on Catholic Healthcare West Hospital System: Environmentally Responsible Principles in Practice," H2E 2002 Award Winner Case Study, undated.

Paper Bleaching Alternatives

Alameda County Waste Management Authority, "Environmentally Preferable Janitorial Paper Supplies in Alameda County," Fact Sheet, October 2002.

City of Palo Alto, "The City of Palo Alto Switch to Paper Processed without Chlorine," Fact Sheet, undated.

Pentachlorophenol Alternatives

City and County of San Francisco, Board of Supervisors, "Resolution urging PG&E, Pacific Bill and manufacturers of non-wood utility poles to conduct a feasibility study of alternatives to chemically treated wood utility poles and urging all utility pole

owners to take steps to protect public health and the environment from wood preservatives in utility poles,” June 18, 2001.

PVC Alternatives

Healthy Building Network, “PVC Free Building Material Alternatives,” product list, June 16, 2003.

Health Care Without Harm, “Alternatives to Polyvinyl Chloride (PVC) and Di-(2-Ethylhexyl) Phthalate (DEHP) Medical Devices,” product list, June 17, 2003.

Wood Burning Alternatives

Bay Area Air Quality Management District, “Woodburning Handbook: Reduce Woodsmoke Pollution by Burning Less Wood or Switching to Natural Gas,” undated.

City of Palo Alto, “City of Palo Alto Woodsmoke-related Dioxin Reduction,” Fact Sheet, undated.

Palo Alto Regional Water Quality Control Plant, “A Growing Concern: Woodsmoke Pollution,” undated.

Dioxins and Persistent Bioaccumulative Toxins Resolutions

Alameda County, Resolution for the County of Alameda Establishing a Policy on Persistent, Bioaccumulative Toxins and their Effects on Public Health and the Environment, 2001.

City of Oakland, Resolution for the City Of Oakland Establishing a Regional Task Force and Policy on Dioxin, Public Health and the Environment, 1999.